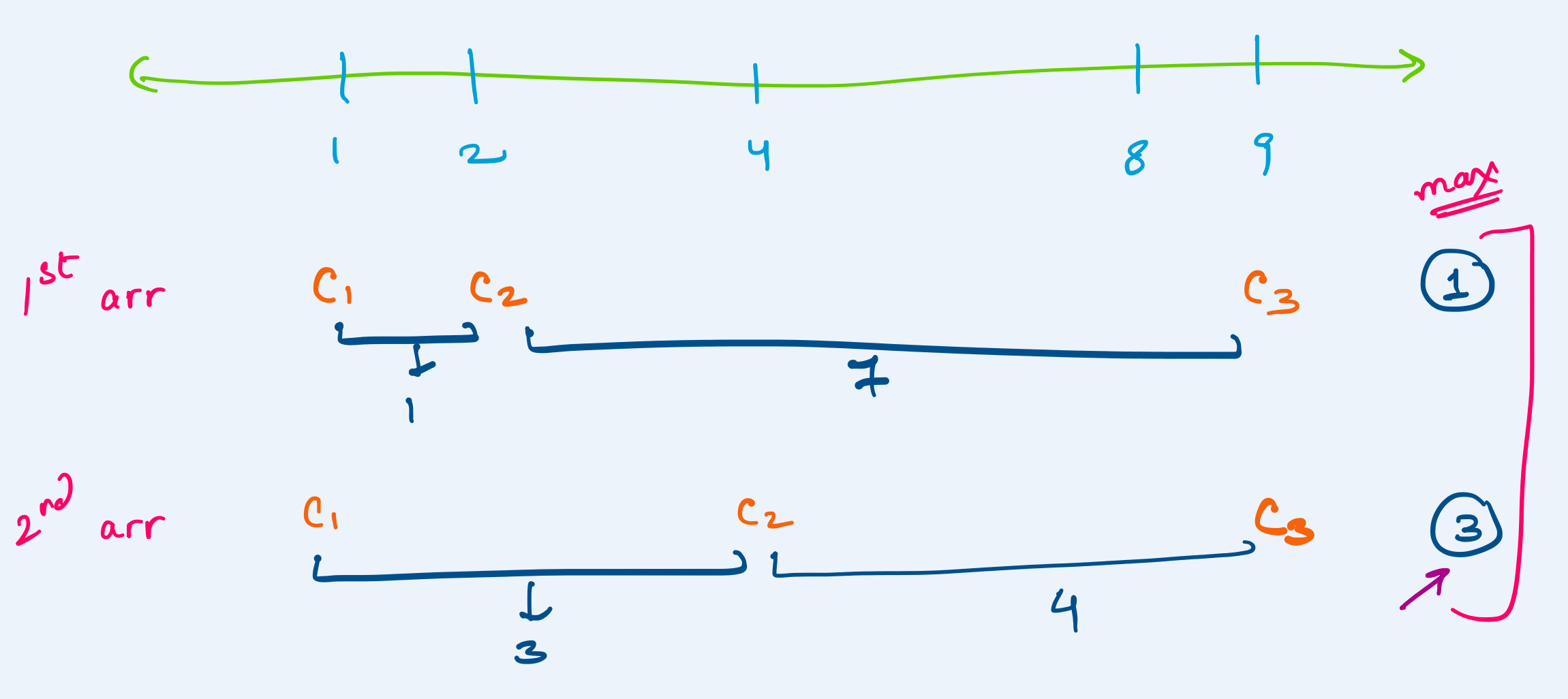
Monday, 8 March 2021 8:31 PM

Ques Aggressive Cows

N stalls → 5 (1, 2, 4, 8, 9) — 3 → C

ans → 3



① Search space

[low → 1, high → max (arr)] → monotonic

C_1 1 — C_2 21

② find mid

1 → max

range → dist b/w cows

mid → min distance b/w cows

③ Take decision based on mid value

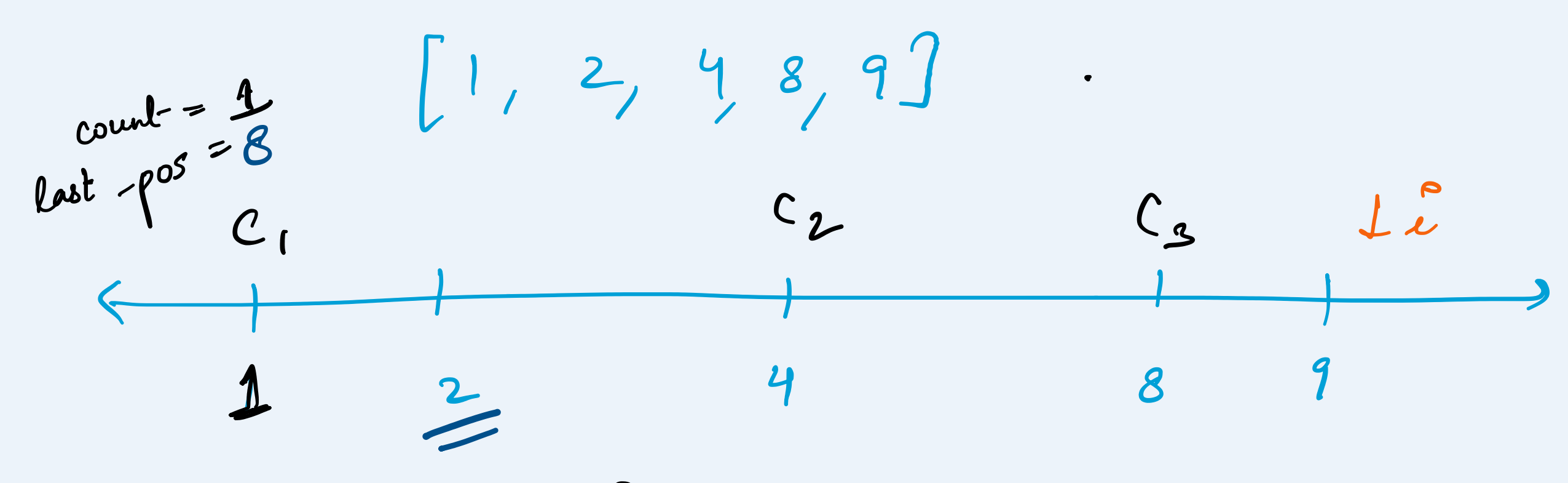
mid → good or not

If I can place all cows atleast mid distance apart

good → right

bad → left

[1, 2, 4, 8, 9]



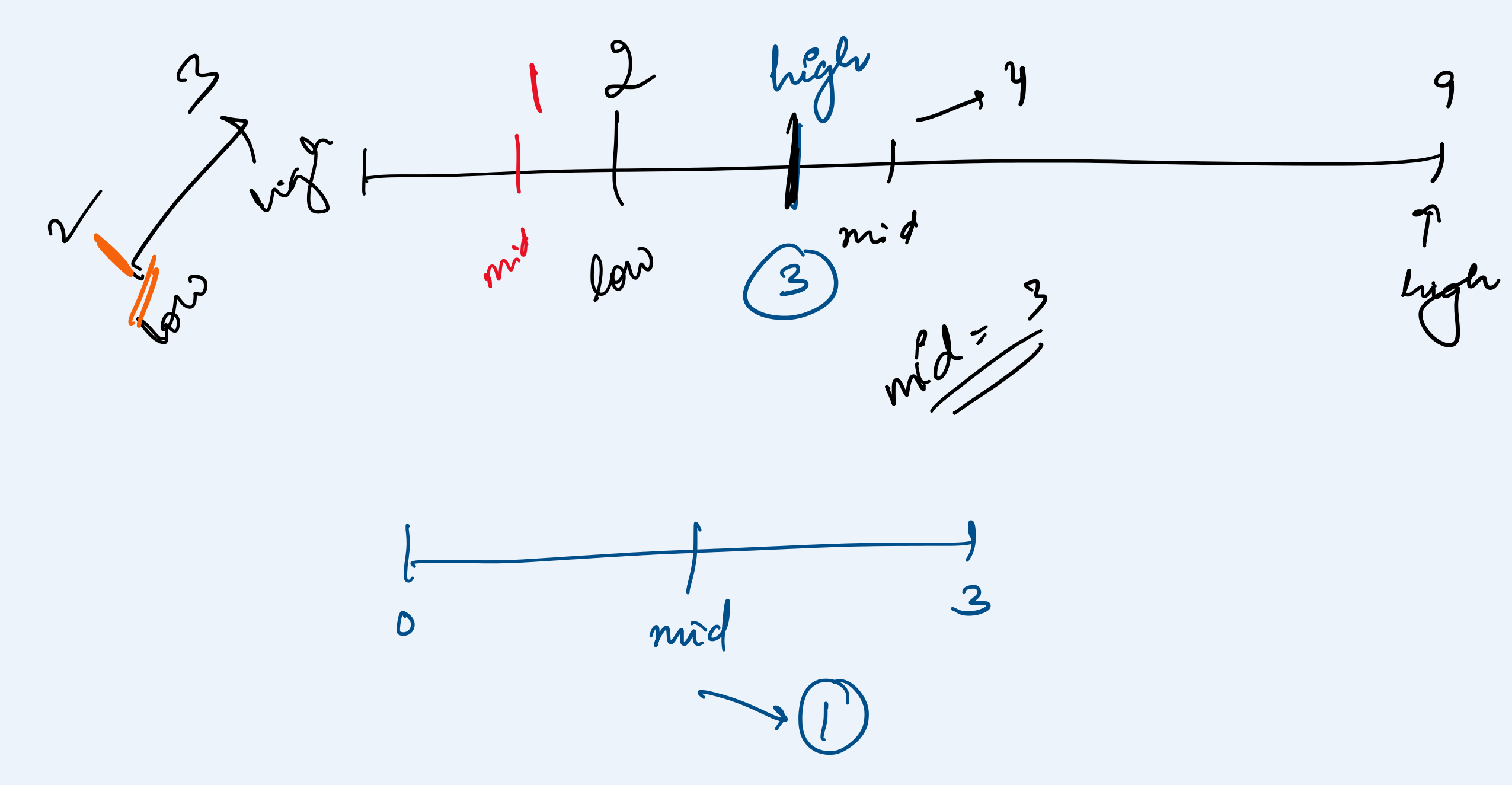
low = 0

high = 9

mid → (0 + 9)/2 → 4

4 − 1 = 3

9 − 8 = 1



Binary Search over Real numbers (float, double)

Ques: Given n ropes of different lengths, a[i] → length of each rope

4 ropes, k → 11

802 → 4 ropes
743 → 3 ropes
457 → 2 ropes
539 → 2 ropes

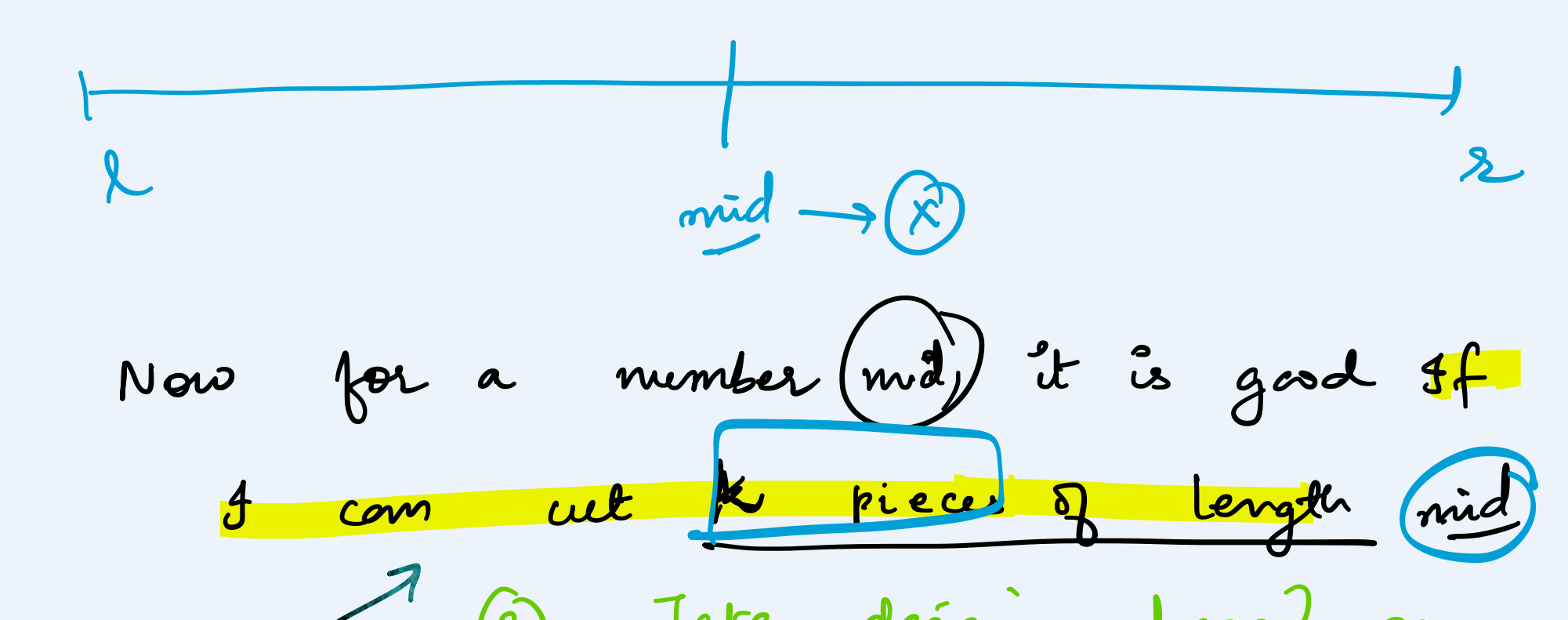
ans → 200.5 → 6 precision digits

You want to cut k pieces of same length. Task is to find the maximum possible length of pieces.

Solving using binary search,

① Search space [l = 0, r = length of longest rope]

② find mid



Now for a number (mid) it is good if I can cut k pieces of length mid

③ Take decision based on mid value.

mid → good or not

mid → good → right

mid → x good → left

Now, if mid is good, then for any length less than mid, we can also cut k pieces.

→ (y < mid, f(mid) = true) ⇒ f(y) = true

mid − 1 mid (inf)

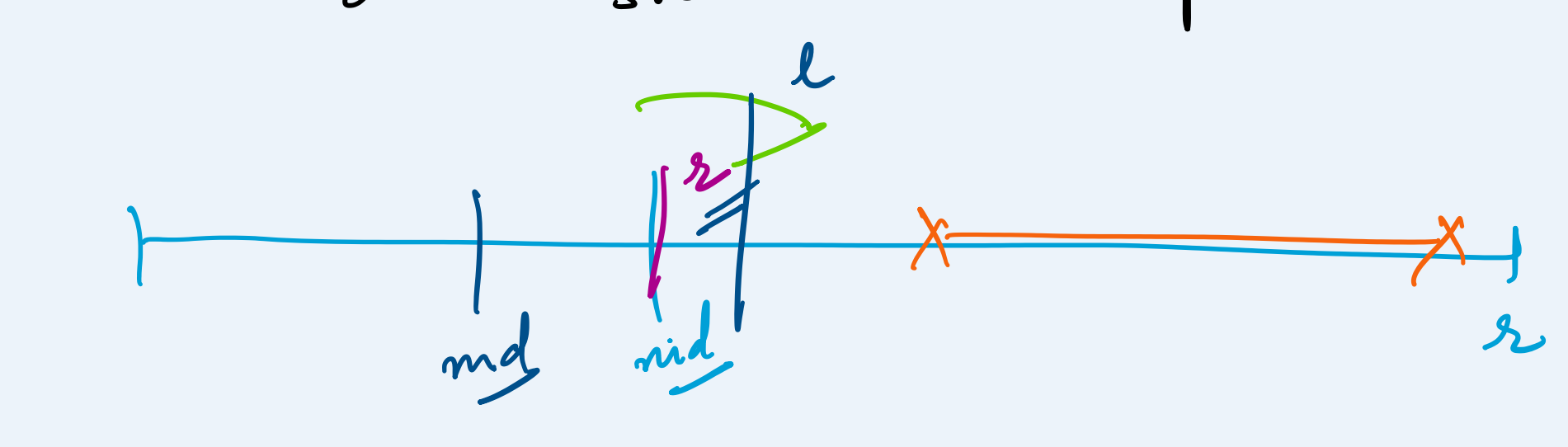
l < r

l = 0

r = max value of array

```
while (r - l) > 10^-6 ?? {
    m = (l + r)/2;
    if (good(m) == 1) {
        l = m;
    else
        r = m;
}
```

→ for real numbers they can be infinitely close to each other and still not overlap.



l → ← r

[l = 3.21356 - - - 51 × 10^20
r = 3.21356 - - - 61 × 10^20] → find mid ??

while (r − l) > 10^{-6} ← ε

→ Because choosing epsilon is very difficult

Too big ε → not accurate enough

Too small ε → lets say 10^{-20}

to have fixed no. of iterations

If $l, r \simeq 10^9$, $Eps \simeq 10^{-9}$

atleast $\log\left(\frac{maxAns}{eps}\right)$ iterations

→ $\log(10^{8}) \simeq 60$

100 iterations

for i = 1 → 100

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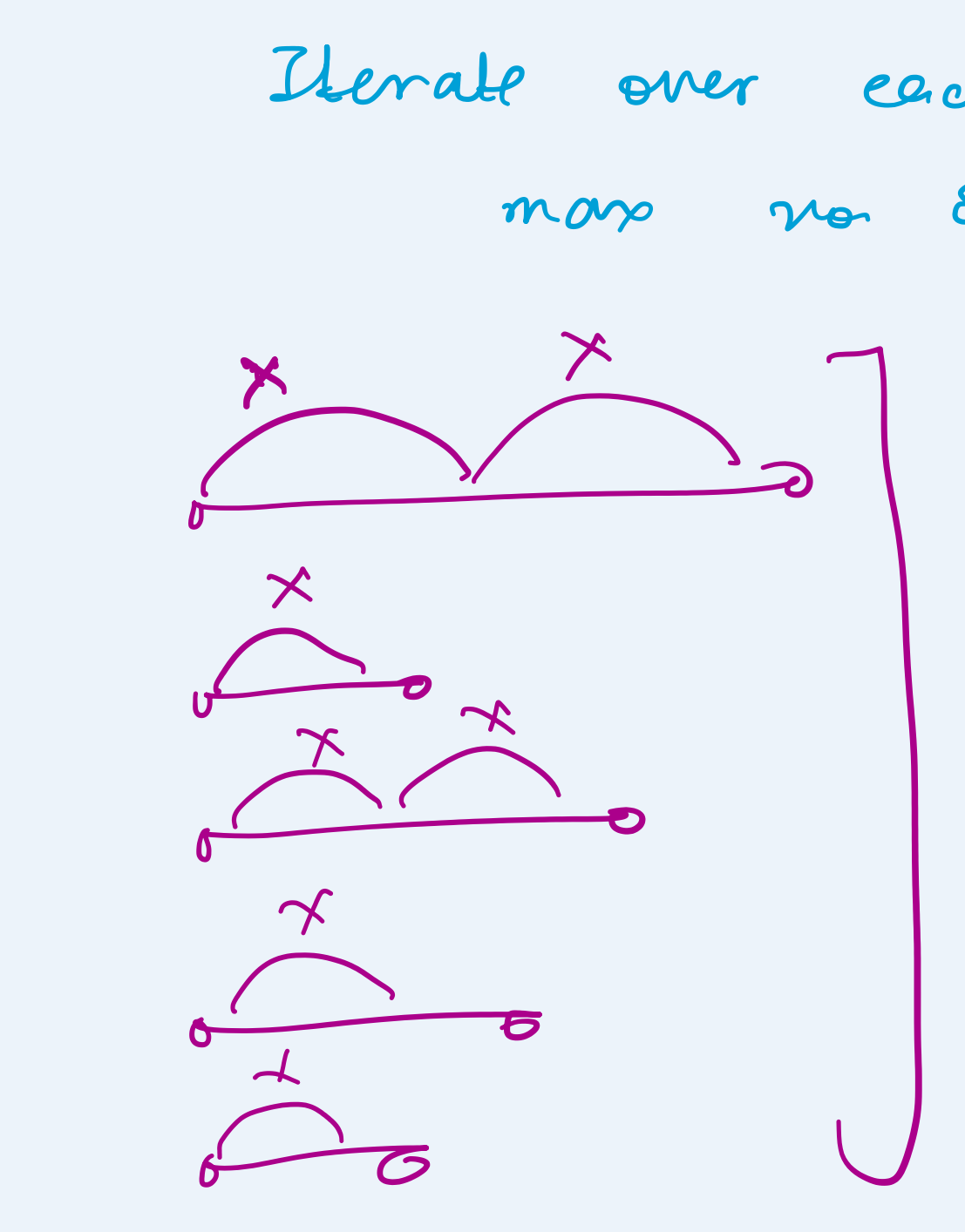
good function

mid → length of each piece

k pieces

checks if it is possible to cut k pieces of length mid.

Iterate over each rope and check the max no. of pieces that can be cut



mid

add up ≥ K

Binary Search

① Search space

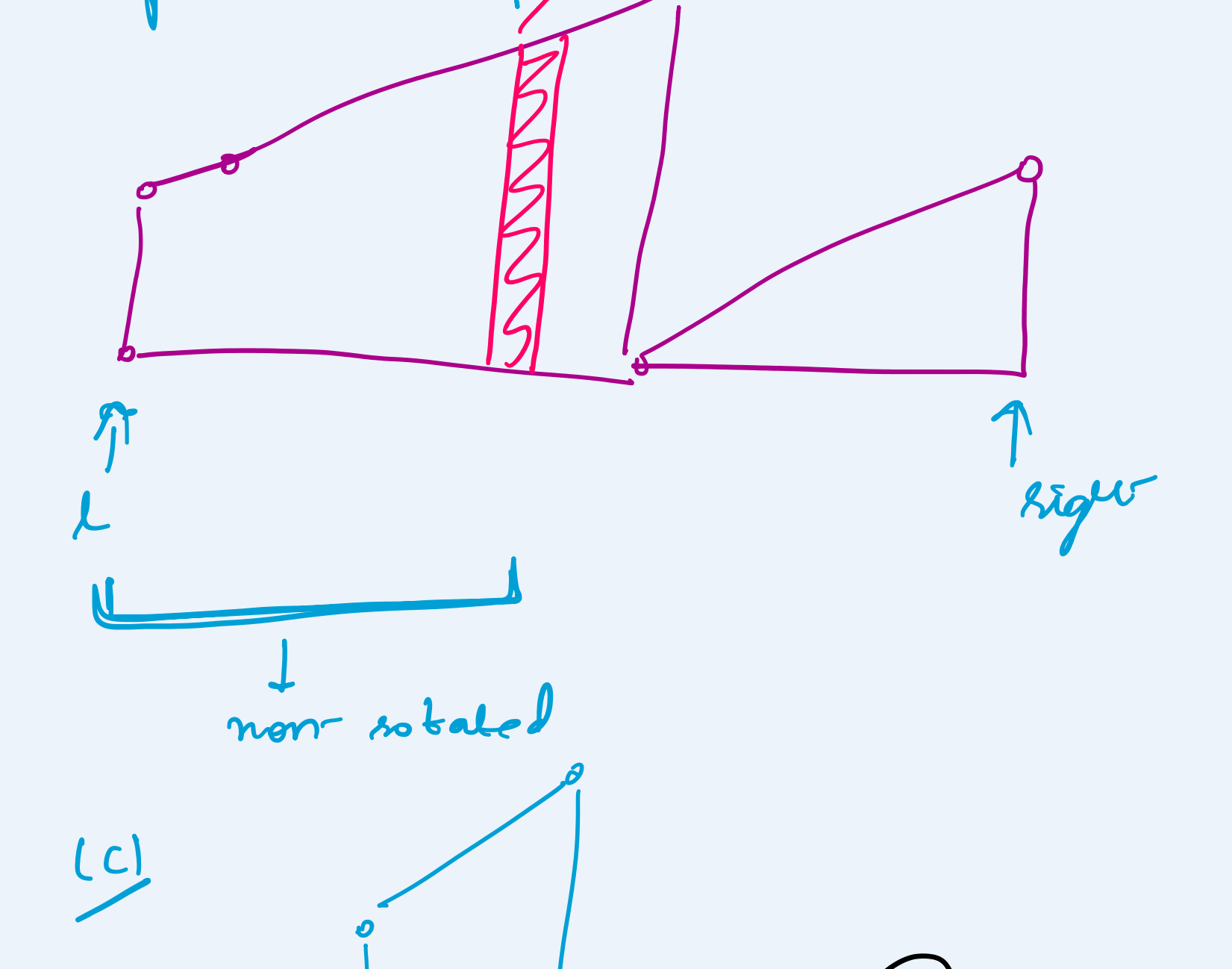
l = 0

r = n − 1;

② find mid = $\frac{l + r}{2}$

③ (a) arr[mid] == target

(b)



(c)